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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/788,148	02/16/2001	Barry Wendt	S30.12-0002	4295

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EXAMINER	
KIBLER, VIRGINIA M	

ART UNIT	PAPER NUMBER
2623	8

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/788,148	WENDT ET AL.	
	Examiner	Art Unit	
	Virginia M Kibler	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-62 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-62 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 16 February 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3,5,7.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 33, 34, 48, 58, and 59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 33, 34, 58, and 59, the limitation "a second data pattern" renders the claims indefinite because there is no mention of a first data pattern.

Claim 48 recites the limitation "the monochrome image" in line 8. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 7-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Ratha et al. ("Adaptive flow orientation based feature extraction in fingerprint images").

Regarding claim 1, Ratha et al. ("Ratha") discloses obtaining a raw scan of an image (Page 13, Figure 6), preprocessing the raw scan to obtain a monochrome image (Sect. 3.1), creating a wire frame image based on the monochrome image (Sect. 3.2), and locating and qualifying a plurality of distinguishing characteristics of the wire frame image (Sect. 3.2-3.3; Sect. 4).

Regarding claim 7, Ratha discloses obtaining a raw scan of a fingerprint (Page 15, Figure 7a).

Regarding claim 8, Ratha discloses locating and qualifying a plurality of fingerprint ridge characteristics of the wire frame image (Sect. 3.2-3.3; Sect. 4).

Regarding claim 9, Ratha discloses locating and qualifying a plurality of bifurcations (Sect. 3.2).

Regarding claim 10, Ratha discloses locating and qualifying a plurality of rods (Figures 3 and 4).

Regarding claim 11, Ratha discloses locating and qualifying a plurality of ridge segments not used by bifurcations or rods (Sect. 3.3).

Regarding claim 12, Ratha discloses locating and qualifying a plurality of vector segments associated with a plurality of bifurcations and rods (Figure 14).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 13-22 and 38-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratha et al. ("Adaptive flow orientation based feature extraction in fingerprint images") as applied to claim 1 above, and further in view of Hara (6,282,302).

Regarding claims 13 and 38, Ratha discloses obtaining a raw scan image with an aspect ratio of a target value 512x512 (Figure 6) and creating an intermediate image by selecting a pixel value for each pixel in the intermediate image based on an averaging of a corresponding pixel array taken from the raw scan (Figure 8). Ratha does not expressly disclose creating a corrected raw scan by modifying the aspect ratio to a target value. However, Hara discloses creating a corrected raw scan by modifying the aspect ratio to a target value (Col. 5, lines 54-61; Col. 6, lines 33-36). Ratha and Hara are combinable because they are from the same field of endeavor of fingerprint image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have modified the input raw scan of a predefined aspect ratio disclosed by Ratha to include correcting the raw scan by modifying the aspect ratio. The motivation for doing so would have been because it will expand versatility of the system to encompass receiving inputs of various aspect ratios. Therefore, it would have been obvious to combine Ratha with Hara to obtain the invention as specified in claims 13 and 38.

Regarding claims 14 and 39, Ratha discloses creating an enhanced image by scanning the intermediate image for a plurality of edges and emphasizing the edges (Sect. 3.1.3).

Regarding claims 15 and 40, Ratha discloses reducing the enhanced image to a monochrome image (Sect. 3.1.3; Figure 10).

Regarding claims 16 and 41, Ratha discloses producing a filled monochrome image by locating and filling a plurality of irregularities in the monochrome image (Sect. 3.2-3.3).

Regarding claims 17 and 42, Ratha discloses creating a set of image data element points by recording identification information pertaining to the plurality of irregularities (Sect. 3.2-3.3). Note, Ratha discloses deleting irregularities from the detected set of minutiae (Abstract) which includes x-coordinate, y-coordinate, and ridge direction (Sect. 2).

Regarding claims 18 and 43, Ratha discloses the identification information includes values pertaining to a location of each irregularity and a slope value of a ridge that each irregularity resides on (Sect. 3.2-3.3). Ratha discloses deleting irregularities from the detected set of minutiae (Abstract) which includes x-coordinate, y-coordinate, and ridge direction (Sect. 2).

Regarding claims 19 and 44, Ratha discloses including a size measurement of each irregularity (Sect. 3.3).

Regarding claims 20 and 45, Ratha discloses completing the monochrome image by adding and removing pixels to a plurality of edges located within the filled monochrome image (Sect. 3.3).

Regarding claims 21 and 46, Ratha discloses a predetermined aspect ratio of 1 to 1 (Figure 6). The arguments analogous to those presented above for claim 13 are applicable to claims 21 and 46.

Regarding claims 22 and 47, Ratha discloses averaging the n x n pixel array to produce a single pixel value to be incorporated into the intermediate image (Sect. 3.1.1).

7. Claims 23-28 and 48-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratha et al. ("Adaptive flow orientation based feature extraction in fingerprint images") as applied to claim 1 above, and further in view of Shibuya (5,497,429).

Regarding claims 23 and 48, Ratha discloses a monochrome image including a plurality of edges (Sect. 3.1) and creating a thinned version of the monochrome image by thinning the plurality of edges wherein thinning converts the plurality of edges into a plurality of wire frame lines (Sect. 3.2). Ratha does not appear to recognize identifying a plurality of pixels in the monochrome image that form the approximate center of the plurality of edges. However, Shibuya discloses identifying a plurality of pixels that form the approximate center of a plurality of edges and creating a thinned version by thinning the plurality of edges to the plurality of pixels that form the approximate center of the edges (Col. 1, lines 19-27). Ratha and Shibuya are combinable because they are from the same field of endeavor of fingerprint image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the thinning of ridges disclosed by Ratha to thinning to the center of the ridge. The motivation for doing so would have been because it is well known methodology routinely implemented in the art and provides increased accuracy of the relative locations of the ridges in the thinned version. Therefore, it would have been obvious to combine Ratha with Shibuya to obtain the invention as specified in claims 23 and 48.

Regarding claims 24 and 49, Ratha discloses removing excess pixels from the plurality of wire frame lines (Sect. 3.2).

Regarding claims 25 and 50, Ratha discloses creating a refined set of wire frame lines by identifying and eliminating a plurality of inconsistent branches from the plurality of wire frame lines (Sect. 3.2; Figure 11).

Regarding claims 26 and 51, Ratha discloses removing excess pixels from the set of refined wire frame lines (Sect. 3.3).

Regarding claims 27 and 52, Ratha discloses creating a further refined set of wire frame lines by identifying and eliminating a plurality of inconsistent branches from the plurality of refined wire frame lines, the further refined wire frame lines having a plurality of end-points (Sect. 3.3).

Regarding claims 28 and 53, Ratha discloses identifying and joining a plurality of end-point pairs that demonstrate a continuous data pattern (Sect. 3.3).

8. Claims 29-37 and 54-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratha et al. ("Adaptive flow orientation based feature extraction in fingerprint images") and Shibuya (5,497,429) as applied to claims 27 and 53 above, and further in view of Davis (5,420,937).

Regarding claims 29 and 54, Ratha discloses scanning the wire frame lines contained in the thinned version of the monochrome image and identifying a plurality of end-points (Sect. 3.4). Ratha and Shibuya do not appear to expressly disclose placing coordinate identification in tables. However, Davis discloses creating a minutia table including end-point and center-point coordinate identification (Col. 8, lines 50-65). Ratha, Shibuya, and Davis are combinable because they are from the same field of endeavor of fingerprint image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have modified

the tracking disclosed by Ratha to include creating an end-point table and a center-point table. The motivation for doing so would have been because it is a well-known methodology routinely implemented in the art for representing statistical information. Therefore, it would have been obvious to combine Ratha and Shibuya with Davis to obtain the invention as specified in claims 29 and 54.

Regarding claims 30 and 55, Ratha discloses eliminating a plurality of pixels that correspond to a particular plurality of branches that extend from the wire frame lines and demonstrate a first data pattern (Sect. 3.3).

Regarding claims 31 and 56, Ratha discloses eliminating a plurality of pixels that correspond to a particular plurality of branches that extend from the wire frame lines and demonstrate a first data pattern that includes data elements from end-points and slopes (Sect. 3.3).

Regarding claims 32, 35, 37, 57, 60, and 62, Ratha discloses re-computing the minutiae points after removing excess pixels from the set of wire frame lines (Figure 13; Sect. 3.3). The arguments analogous to those presented above for claim 38 are applicable to claims 32, 35, 37, 57, 60, and 62.

Regarding claims 33 and 58, Ratha discloses eliminating a plurality of pixels that correspond to a particular plurality of branches that extend from the refined wire frame lines and demonstrate a data pattern (Sect. 3.3).

Regarding claims 34 and 59, Ratha discloses eliminating a plurality of pixels that correspond to a particular plurality of branches that extend from the refined wire frame lines and demonstrate a data pattern that includes data elements from end-points and slopes (Sect. 3.3).

Regarding claims 36 and 63, Ratha discloses identifying and joining a plurality of end-point pairs that demonstrate a continuous data pattern including end-points and slopes (Sect. 3.3).

9. Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratha et al. ("Adaptive flow orientation based feature extraction in fingerprint images") as applied to claim 1 above, and further in view of Davis (5,420,937).

Regarding claim 2, Ratha discloses obtaining slope information based on the monochrome image (Sect. 3.3). Ratha does not expressly disclose generating a slope table. However, Davis discloses creating a minutia table including slope (Col. 8, lines 50-65). Ratha and Davis are combinable because they are from the same field of endeavor of fingerprint image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have modified the tracking disclosed by Ratha to include creating a slope table. The motivation for doing so would have been because it is a well-known methodology routinely implemented in the art for representing statistical information. Therefore, it would have been obvious to combine Ratha with Davis to obtain the invention as specified in claim 2.

Regarding claim 3, Ratha discloses generating a statistical representation and accessing and using the statistical representation to determine quality classifications based on the raw scan image (Sect. 3.1.2).

Regarding claim 4, Ratha discloses accessing and using statistical representation to determine additional classifications based on brightness levels within the raw scan of the image (Sect. 3.1.2).

Regarding claim 5, Ratha discloses dividing the monochrome image into a plurality of pixel grids (Sect. 3.2), performing a contour trace through the plurality of pixel grids (Sect. 3.3;

Figure 12), and utilizing the corresponding data to calculate a slope value (Sect. 3.3). The arguments analogous to those presented above for claim 2 are applicable to claim 5.

Regarding claim 6, Ratha discloses an array of n x n pixel grids (Sect. 3.2).

Other Prior Art Cited

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hong et al., "Fingerprint Image Enhancement : Algorithm and Performance Evaluation," IEEE 1998, pages 777-789 ; and

Xiao et al., "A Combined Statistical and Structural Approach for Fingerprint Image Postprocessing," IEEE 1990, pages 331-335.

Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Virginia M Kibler whose telephone number is (703) 306-4072. The examiner can normally be reached on Mon-Thurs 8:00 - 5:30 and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Virginia Kibler
4/14/04

MEHRDAD DASTOURI
PRIMARY EXAMINER